III. REMARKS

A. Introduction

This invention generally relates to multi-polarization active array transmit antennas. In particular, the application describes a chip comprising phase shifters that control the scan angle, linear polarization, and circular polarization of an RF signal.

B. Pending Claims

Claims 1-10, 22-32, and 34-45 are pending.

C. Requested Interview

Applicant has requested an interview with the Examiner to discuss the pending claims, rejections, and prior art. Applicant thanks the Examiner for agreeing to speak with the Applicant and Applicant's representatives about the application. Applicant hopes that an interview will help to clarify Applicant's position regarding the outstanding rejections and how Applicant believes the pending claims distinguish over the prior art.

Applicant invites the Examiner to conduct the interview before reviewing this Response. Many of the arguments discussed below are similar (or identical) to those of prior responses.

D. Rejection of Claims 1-10, 22-32, and 34-45

Claims 1-10, 22-32, and 34-45 have been rejected. Applicant respectfully submits that these rejections are improper, for the reasons described in prior responses and as described below.

1. Rejection of Claims 1-10, 22-32 and 34-45 Under 35 U.S.C. §103(a) as being unpatentable over Fassett in view of Jacomb-Hood and Nathanson.

The Examiner rejected claims 1-10, 22-32 and 34-45 as being unpatentable over U.S. Pat. No. 4,088.970 to Fassett et al. ("Fassett") in view of U.S. Pat. No. 4,806,944 to Jacomb-Hood ("Jacomb-Hood") and U.S. Pat. No. 4,823,136 to Nathanson et al. ("Nathanson").

Fassett discloses a phase shifter / polarization switch comprising a phase shifter, a combiner, and a divider. Fassett's circuit is capable of providing a scan angle and any one of six separate polarization senses (vertical, horizontal, and $\pm$ 45° linear polarization, and left hand and right hand circular polarization). The polarization switch is shown in Figure 4 of the Fassett disclosure.

Fassett fails to disclose an attenuator. Thus, Fassett fails to disclose using an attenuator to control scan angle. Similarly, Fassett fails to disclose using an attenuator to control linear polarization.

Jacomb-Hood discloses an attenuator in the path between a transmitter power amplifier and a radiator of a steerable active array antenna to compensate for the mismatching that occurs when the antenna is steered away from a bore sight. See Figures 2 and 3 of the Jacomb-Hood disclosure. Jacomb-Hood does not disclose using an attenuator to control scan angle or linear polarization, nor does Jacomb-Hood suggest using an attenuator for anything other than its disclosed purpose of compensating mismatching (i.e., preventing loss of power to the antenna).

Nathanson discloses a Transmit/Receive (T/R) module that is fabricated on a GaAs substrate/chip. This GaAs chip does not contain a digital controller (e.g., an SPC) as shown in Figure 2 of the Nathanson disclosure. Thus, Nathanson's circuit is not capable of providing a polarized signal, either linear or circular.

Nathanson discloses an attenuator at the input of the T/R module (Figure 2). However, Nathanson does not disclose the function of the attenuator. In particular, Nathanson does not disclose using an attenuator to control linear polarization or scan angle. Regardless of disclosure, the attenuator in Nathanson cannot be used to control the linear polarization angle.

The amplifiers in the Nathanson circuits only provide amplification to the RF signal. The gain control is defined as maintaining a flat RF signal across the frequency band (col. 7, line 31 - col. 8, line 5). Nathanson does not disclose controlling amplitude to control the polarization angle or scan angle.

Thus, none of the cited references disclose using an attenuator to control linear polarization. Thus, the combination of these references does not teach using an attenuator to control linear polarization, as recited (or incorporated) in claims 1-10, 22-32 and 34-45.

The Examiner did not specifically assert that the references teach various dependent claim elements, nor did the Examiner show where such elements were disclosed in the references. For instance, the Examiner did not assert that the references teach such elements as a serial-to-parallel converter (claim 2), 5.625 degree phase shifters (claim 3), a 3-bit attenuator and three single-stage amplifiers (claim 4), TTL used to control

polarization and scan angle (claim 5), etc. Applicant submits that the asserted references fail to disclose all dependent claim elements not specifically mentioned by the Examiner.

Further, there is no motivation to combine Fassett, Jacomb-Hood, and Nathanson with one another. The Examiner has not shown an implicit or explicit motivation in any of the references to combine them with any of the other references.

The Examiner also states that "it would have been obvious...to increase the phase resolution at the expense of a greater cost by providing additional bits of resolution, each of which is half of the preceding." Applicant submits that it would not have been obvious. Such a proposal was not feasible using prior systems and methods and would not have been considered by a skilled artisan.

For at least these reasons, the combination of Fassett, Jacomb-Hood, and Nathanson fail to teach claims 1-10, 22-32, and 34-45. Accordingly, Applicant respectfully requests the Examiner to withdraw the instant rejection of these claims.

2. Rejection of Claims 1-10, 22-32 and 34-45 Under 35 U.S.C. §103(a) as being unpatentable over Caille in view of Fasset and Applicant's Admission of Prior Art

The Examiner rejected claims 1-10, 22-32 and 34-45 as being unpatentable over U.S. Pat. No. 5,659,322 to Caille ("Caille") in view of Fassett et al. and Applicant's admission of the prior art use of GaAs chips.

Caille discloses a Transmit/Receive device (T/R) that is capable of providing horizontal and vertical linear polarization and left hand and right hand circular polarization. Caille achieves polarization by connecting the outputs of two T/R circuits (52a and 52b output ports in the Figure 2 of the Caille disclosure) to a cross polarized

radiator element. Caille uses phase shifter 27 to scan the beam. Caille uses attenuator (26) to shape the antenna beam and reduce secondary lobes (Column 2, lines 16-21).

As shown in Figures 3 and 4 of the Caille disclosure, Caille uses two 90° hybrid elements 5a and 5b and four one bit phase shifters (1, 2, 3, and 4) to achieve various polarization states. The circuits in Figures 1-4 and 6 do not disclose using an attenuator to control scan angle or linear polarization. Rather, the attenuator 28 of Figures 3 and 4 is used for beam shaping.

Caille fails to disclose using a phase shifter to control linear polarization. Further, Caille fails to disclose using an attenuator to control scan angle.

Fassett discloses a phase shifter and polarization switch as described above. Fassett fails to disclose an attenuator.

The teachings of Fassett and Caille cannot be combined, and their disclosures teach away from combination. Caille discloses a 2-channel T/R module. Fassett contains a coupler. It is not clear how a polarization switch (Fassett) could be combined with a T/R circuit (shown in Figure 5 of Caille). (It should be noted that the other circuits disclosed in Caille (Figures 1-4 and 6) have only a single attenuator applied to both outputs and therefore cannot possibly be used to control scan angle or linear polarization.) If the Fassett circuit were combined with a transmitter/receiver (T/R) circuit, the combination might be used for transmitting, but not receiving, and it would therefore lose half of its functionality. Thus, the references actually teach away from combination. The Applicant requests the Examiner to explain how a relevant skilled artisan might combine the teachings of Fassett and Caille in a single embodiment.

In addition, the Fassett and Caille references contain no motivation to combine with each other. The Examiner has not shown such motivation in the references.

However, even if the teachings of Caille and Fassett were combined, the combination fails to disclose using an attenuator to control scan angle as recited in claims 1-10, 30-32 and 34-45.

Finally, the Examiner did not specifically assert that the references teach various dependent claim elements, nor did the Examiner show where such elements were disclosed in the references. For instance, the Examiner did not assert that the references teach such elements as a serial-to-parallel converter (claim 2), 5.625 degree phase shifters (claim 3), a 3-bit attenuator and three single-stage amplifiers (claim 4), TTL used to control polarization and scan angle (claim 5), etc. Applicant submits that the asserted references fail to disclose all dependent claim elements not specifically mentioned by the Examiner.

For at least these reasons, Applicant respectfully requests the Examiner to withdraw the instant rejection of claims 1-10, 22-32 and 34-45.

VI. Conclusion

Applicant respectfully submits that the claims as amended are supported by the specification and therefore add no new matter. Applicant further submits that the application is in condition for allowance and respectfully requests a notice of allowance for the pending claims. Should the Examiner determine that any further action is necessary to place this application in condition for allowance, the Examiner is kindly requested and encouraged to telephone Applicant's undersigned representative at the number listed below.

A Petition for One-Month Extension of Time is filed concurrently with this response. Applicant hereby provides authorization to charge fees associated with the filing of this response and the Petition for One-Month Extension of Time against deposit account 50-0206.

Applicant also looks forward to an Interview with the Examiner.

Respectfully submitted,

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